Ecology: The Biotic and Abiotic Environment

7-4 The student will demonstrate an understanding of how organisms interact with and respond to the biotic and abiotic components of their environments. (Earth Science, Life Science)

7.4.2 Illustrate energy flow in food chains, food webs, and energy pyramids.
Taxonomy level: 2.2-B Understand Conceptual Knowledge

Previous/Future knowledge: In 3rd grade (3-2.5), students summarized the organization of simple food chains (including the roles of producers, consumers, and decomposers). In 5th grade (5-2.4), students identified the roles of organisms as they interact and depend on one another through food chains and food webs in an ecosystem, considering producers and consumers (herbivores, carnivores, and omnivores), decomposers (microorganisms, termites, worms, and fungi), predators and prey, and parasites and hosts.

It is essential for students to know organisms have energy roles in their environments. Each role is determined by how the organism obtains its energy and how they interact with other organisms in the environment. These roles can be classified as producer, consumer, or decomposer. The flow of energy in an environment can be represented using the following diagrams:

Food chains
- Use pictures or words and arrows to show the movement of energy through the *trophic levels* of organisms.
- The trophic level of an organism indicates the position that the organism occupies in the food chain—what it eats and what eats it.
- The levels are numbered according to how far the particular organism is along the chain from the primary producer at Level 1, to herbivores (Level 2), to predators (Level 3), to carnivores or top carnivores (Levels 4 or 5).

Food webs
- Describe the organisms found in interconnecting food chains using pictures or words and arrows.
- Food webs describe the complex patterns of energy flow in an ecosystem by modeling who consumes whom or what.

Energy pyramids
- Show the amount of energy that moves from one trophic level to another in a food chain.
- The most energy is available at the producer level of the pyramid.
- Energy availability decreases as it moves up the energy pyramid.

It is not essential for students to know how to calculate the amount of energy transferred or lost from one level to another level. Students do not need to know the roles that organisms play in the geochemical cycles (including the cycles of carbon, nitrogen, and water). It is also not essential for students to know the relationships among organisms (including predation, competition, and symbiotic relationships such as parasitism, mutualism, and commensalism) as these topics will be discussed in high school biology.

Ecology: The Biotic and Abiotic Environment

7-4 The student will demonstrate an understanding of how organisms interact with and respond to the biotic and abiotic components of their environments. (Earth Science, Life Science)

Assessment Guidelines:

The objective of this indicator is to *illustrate* energy flow in food chains, food webs, and energy pyramids; therefore, the primary focus of assessment should be to give examples of how energy flows in food chains, food webs and energy pyramids. However, appropriate assessments should also require student to *identify* the roles that organisms serve in food chains, food webs and energy pyramids; *illustrate* food chains, food webs, and energy pyramids using words, pictures, or diagrams; *recognize* the trophic levels found in food chains, food webs, and energy pyramids; or *summarize* the roles that organisms play in a food chain, food web, or energy pyramid.